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Soil Conservation

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LAND AND WATER RESOURCES

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SOIL CONSERVATION SERVICE

U. S. DEPARTMENT OF AGRICULTURE

Careers . . . .

We pay respects this month to two career conservationists, one leaving, the other entering, the No. 2 command post of SCS.

Gladwin Young's retirement as associate administrator April 30 marks 44 years of service to the cause of sound and economic use of land and water (p. 220).

At the halfway point in a similar career, Kenneth Grant (p. 235) steps up to share the Administrator's daily responsibilities.

Water at work: A prime tenet of Gladwin Young's philosophy has been that land and water resources should serve the needs of people and that this happy result comes only to the degree that people manage resources wisely.

This is his message to the Conference on "Water for Peace" as he argues (p. 220) that the greatest opportunity for meeting growing water requirements is through more efficient use of present supplies.

This article along with his recent statement on farm drainage (December *Soil Conservation*) gives us a cogent summary of principles of water conservation.

Stewardship: Soil Stewardship Week (April 30 to May 7) always invites us to reexamine our sense of responsibility for the land resources we share in common.

A special editorial (p. 219) and the Administrator's page serve to sharpen our focus on this responsibility.

COVER: The countryside and the village that depends upon it spread out before the conservationist and land owner jointly reviewing the conservation plan for a farm in the Perry Soil Conservation District, Ohio.

Soil Conservation

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Focus on Conservation

(Editorial)

Conservation has become increasingly competitive.

It is competitive as to meaning.

It is competitive as to function.

It is competitive within government.

It is competitive outside government.

It means many different things to many different people.

It *is* many things to many different people.

Modify "conservation" by "natural resources" and you eliminate frill types of conservation employed by Madison Avenue—gasoline and tire mileage, armchair TV tuning, erasing washday blues, and the like.

Modify "conservation" by "renewable natural resources" and you eliminate another kind of conservation—that pertaining to coal, minerals, gas, oil, and similar resources.

"Renewable natural resources" include soil, water, trees, grasses and other plants, and wildlife.

Most of these basic resources are in the ownership and under the care of private citizens. About three-fourths of the area of our 48 mainland States is privately owned.

The conservation practiced on these lands makes it possible for all citizens to ultimately enjoy their own particular form of conservation.

Far too few of us realize that the principal guardian of our heritage of forests, soil, water, trees, grass, and wildlife is not the Federal Government, or the State conservation departments, but the millions of individual landowners throughout the Nation.

The Federal and State conservation agencies can counsel and assist the private owners, but the responsibility and the initiative are theirs. Their collective response is the reality of conservation.

In the Federal establishment, it is the Department of Agriculture that provides the conservation assistance available to the owners and managers of the three-fourths of our land that is in private ownership. The Soil Conservation Service is the principal technical agency charged with this responsibility. The 3,000 soil and water conservation districts that blanket the land coordinate and direct these conservation efforts in the public interest.

How little this is understood!

For within the realm of "renewable natural resources" are many highly specialized interest groups.

Those interested mainly in flowers or birds.

Those interested mainly in hunting and fishing.

Those interested mainly in swimming or boating or hiking, or nature study, or picnicking, or the like.

Those interested mainly in preserving wilderness areas and wild rivers.

Those who oppose all other "conservation" activities such as major reservoirs or highways or public parks that they think would harm their main interest.

Conservation is all these things and more.

It is a diverse and complex subject. It is little understood in its broad totality because it has so many adherents who see it from so many different viewpoints and view it in so many different lights.

But conservation has a common denominator. Underlying conservation in all its varieties and forms—and upon which all kinds of conservation depend completely—is the land itself and its soil and its water and its plants.

From these basics spring all forms of conservation. Without them conservation by any definition has no form or substance. Without them conservation is only a meaningless word.

Conservation begins with soil, water, and plants. They are the base.

These basic resources form the common bond joining the varied interests of all resource users, whatever may be their specialized definition of what conservation means.

Upon this base is built a policy of cooperation between the U. S. Department of Agriculture and the owners and operators of three-fourths of the American land—a policy that recognizes the legitimate ends of resource use for the benefit both of the individual and of the larger society.—H.J. ♦

Water for Peace

By Gladwin E. Young
Associate Administrator

GLADWIN E. YOUNG *is especially well qualified to write on the subject of water use and conservation because of his long experience with the economics of land and water resources.*

Upon his retirement April 30, Mr. Young ends 44 years of public service in this field, the last 14 as deputy and associate administrator of the Soil Conservation Service. He will be succeeded as associate administrator by Kenneth E. Grant (see "Conservation Profile," p. 235).

Mr. Young was especially involved with water problems during the period 1946 to 1952 when he was the Department of Agriculture representative on the Missouri River Basin Inter-Agency Committee with headquarters at Lincoln, Nebr. During this experience, he contributed to the development of concepts of watershed treatment and water management that took form as the small watershed program now administered through the Soil Conservation Service.

After graduating from Purdue University in 1923, Mr. Young was a member of the Indiana Agricultural Experiment Station Staff until he joined the Department of Agriculture in 1934.

In 1938 and 1939 he was in Washington acting in charge of the Division of Land Economics, Bureau of Agricultural Economics. He returned to Milwaukee, Wis., in 1940 as regional representative of BAE. In 1953 he was transferred to Washington and soon was appointed deputy administrator of SCS.

In 1961 Mr. Young received the USDA Superior Service Award for "notable contributions to public understanding and to national policy of the economic and physical relationships between upstream and downstream aspects of water and related land conservation, development, and use."

THE FACT that an international conference is to be held in Washington, D. C., this month under the title "Water for Peace" suggests the great importance of water to mankind's peaceful survival.

It suggests further that peace of the world could be enhanced if the nations could share their experiences and knowledge of how to deal effectively with water problems.

Man's freedoms have always been closely related to abundance of natural resources. When resources are limited, freedoms become limited. When freedoms are limited, peace is threatened.

Water shortages

As populations grow and industry and agriculture expand, water commonly becomes a crucial factor in further development. In one way or another, nearly every nation is experiencing the limiting effects of water shortage. Especially in less developed countries in the vast subhumid and semiarid regions of the world, the need for additional water is an immediate and pressing problem.

It is natural in such circumstances to look for new sources of water supply—to dream of drawing pure water from the limitless sea, of impounding floodwaters behind great dams, of diverting rivers to irrigate distant thirsty fields.

As challenging as these possibilities are, the simple fact remains that the natural distribution of rainfall and snow on the earth's surface sets the basic pattern of water supply, and the greatest opportunity for relieving water shortages is through more efficient use and management of water within that pattern.

The experience of the Soil Conservation Service in helping individual water users and small watershed communities with their water-conservation problems convinces us that there is great potential for making available water serve more needs of more people by using techniques of soil and water conservation.

To grow plants

The significance of this becomes apparent when it is realized that by far the largest proportion of available water is used for growing vegetation under natural precipitation and with the aid of irrigation systems.

If the increasing population of the world is to be served, it is going to be necessary to increase the manipulation of relatively fixed

water supplies to have water at the right places at the right times.

Nature undisturbed or unassisted is a poor provider for the wants and needs of mankind. Consider that the same land that once provided a scant living for only a few hundred thousand American Indians now provides abundance for 200 million citizens of the United States. The difference lies in the ingenuity of science and technology—products of man's brain and skill.

In the quest for a better life for more and more people in the future, even greater ingenuity must be expended toward management and conservation of water supplies.

Ancient aqueducts and canals attest to man's early efforts to manage the location of his water supply. Modern engineering and mechanical equipment have magnified such water developments a thousandfold and given us great storage reservoirs, hydropower plants, navigation channels, and irrigation systems.

The other 70 percent

All of these engineering devices are important and useful to manage water after it has run off the land on which it fell as rain or snow. But in the United States only 30 percent of the total precipitation reaches the rivers and reservoirs.

The Weather Bureau calculates that average annual precipitation, if spread evenly over the 48 mainland States, would be 30 inches a year. This amounts to about 4,300 billion gallons of water a day.

The Geological Survey calculates that streamflow is the equivalent of about 8½ inches a year, or about 1,200 billion gallons a day.

The difference between precipitation and streamflow, or roughly 70 percent of the total water supply, is used by crops, trees, and other vegetation, or escapes through evaporation into the atmosphere or seepage into deep underground storage.

Thus it becomes obvious that opportunities to manage and use water productively must begin with management of vegetation and the land on which the water supply falls. We cannot afford to wait until it runs off into rivers and reservoirs. Water must be used and reused from the time it falls on the fields and forests that make up the watersheds.

The most important use of water, next only to human consumption, is to support the plant and animal life on the land.

Although the amount of evapotranspiration can be modified to some extent, it has not generally been possible to make large changes in the "yield" of total runoff. It has been possible, however, to change the rate of runoff and to improve the quality of water by reducing the amount of sediment caused by erosion.

Control of runoff

The well-known example of the White Hollow Watershed in Tennessee demonstrates the effect that vegetation management can have on runoff. When the 1,715-acre watershed was acquired by the Tennessee Valley Authority in 1934, about two-thirds was in cutover and frequently burned forest land and the remainder in open farmland, mostly steep and eroding.

In 1958, after nearly a quarter-century of protection and revegetation, the annual sediment discharge had decreased to one-twenty-fifth the previous rate, and peak streamflows from comparable storms were reduced significantly. There was no decrease in the volume of surface runoff or groundwater flow and no lowering of the ground-water levels.

Special management practices, however, have been successful in increasing water yield from experimental forest areas. At the Coweeta Hydrologic Laboratory in North Carolina, trimming back annual growth increased water yield 10 inches a year as compared to adjacent untreated areas. At the Fraser Experimental Forest in Colorado, alternate-strip clear cutting increased annual streamflow by 25 percent during the following 8 years. These increases in water yield were accomplished without significant increases in sediment production.

In many farming areas, the widespread adoption of conservation practices has made striking reductions in the sediment loads of streams, improving the quality of the water and reducing the rate of filling of reservoirs.

Irrigation's share

One of the biggest opportunities for water savings is in irrigation agriculture, for irrigation is the Nation's largest user of water.

In the United States, withdrawals of water to support agriculture exceed those for industry. The amount of water "consumed" by irrigation is nearly 30 times the amount that disappears in industrial use.

But only a small part of the withdrawn water is actually used productively. An improvement in the efficiency of irrigation water use could be equivalent to a major addition to our water supply. Even greater opportunities for water conservation through improved irrigation methods exist in other countries.

On the average in the United States it requires 1.7 acre-feet of water delivered to the root zone of each acre of land to produce a crop. Under prevailing practices today, a total of 6.6 acre-feet of water is withdrawn for each acre irrigated. The difference, 4.9 acre-feet, is lost to seepage and evaporation before the water is delivered to the root zone.

Allowing for the re-use of water that is recovered from seepage and tailwater from excessive irrigation, only about 43 percent of the water withdrawn actually reaches the intended place in the soil for crop production.

The Department of Agriculture estimates that the average gross withdrawal of 6.6 acre-feet could be reduced to 3.6 acre-feet by the year 2000 by the application of a vigorous program of conservation practices. Such an improvement in efficiency would make it possible to irrigate 20 percent more land with the same withdrawals of water.

The principle of using water again and again from the time it falls on the land until it reaches the sea is fundamental to getting the maximum benefit from the available supply.

About three-fourths of the land area of the United States, exclusive of Alaska, is owned by private citizens who make the final decisions about its use.

Public interest

The public has a vital interest in how the actions of these landholders affect the general water supply. This interest is expressed through cooperative programs between the Federal Government and individuals and groups of landholders, and with State and local governments that exercise some control over landholders. The soil and water conservation programs are administered mainly by the Soil Conservation Service on the part of the Federal Government and are carried out through conservation districts and small watershed projects representing the landholders.

They profoundly affect the impoundment, distribution, and control of the 30 percent of our water supply that runs off the land into the streams and can be manipulated for irrigation, drainage, flood prevention, urban water supply, farm ponds, recreational use, and in many other ways.

More importantly, the management of vegetation and soils influences the use and conservation of the 70 percent that is held on the land and is returned to the atmosphere or underground storage without appearing in impoundments or withdrawals for specific uses.

Obviously, the greatest opportunities for coping with water shortages lie in more efficient methods of manipulating the supply that comes to us in the natural course of the hydrologic cycle, rather than in storing and transporting water after it leaves the land where most of it needs to be used. ♦

Sediment Brings Early Death by Strangulation to Colonial Port

By John N. Holeman
Geologist, Engineering Division, SCS, Hyattsville, Md.

ONLY the abandoned home of the harbormaster remains today as a relic of a Maryland colonial port that once handled more trade than Baltimore, 16 miles to the south on Chesapeake Bay.

Stately Rumsey Mansion, built in 1721, now stands vacant amidst ancient trees shading a cool lawn that stretches a hundred yards to the shore where ocean-going ships once docked at thriving Joppa Town, Md.

Now one looks a mile across marshy mudflats to the nearest open water—and that too shallow to float a cargo-laden vessel. Within less than a century after farming began in the area, sediment had choked the protected harbor in the estuary below Gunpowder Falls and the county seat shifted from Joppa Town to Baltimore.

The story of the strangulation of Joppa Town by sediment is repeated in the history of dozens of other early-day settlements on the estuaries and navigable rivers of the Atlantic seaboard. The process continues even today. The Soil Conservation Service estimates that 4 billion tons of soil is eroded from the land of the United States annually. Almost a fourth of this amount is carried by rivers to the sea.

To understand what caused the death of Joppa Town, a brief review of the local history is in order. Before the Europeans came to this area, some of the Indians practiced a rudimentary agriculture which had no effect on erosion rates.

From the first permanent English settlement at Jamestown in 1607, the colonists spread out slow-

New homes are now being built within a few yards of the original shoreline of old Joppa Town harbor.

ly over the tidal areas surrounding the Chesapeake Bay. With axes and fire they cleared the forest to make way for farming. Most of the land was planted to tobacco.

By 1700 most of the local Coastal Plain had been claimed, and newcomers began to settle above the "fall line" that marked the upper limits of navigation on the rivers. It was at the fall line that wharves, warehouses, and communities developed.

The very activity, the growing and shipping of tobacco, that created the towns also contained the seeds of their doom.

Planters found that after five or six crops of tobacco were grown on a newly cleared field, the yield and quality of the crop declined sharply. Then a new field would be cleared and the impoverished one abandoned, for it was easier to move to new land than to maintain or restore the productivity of the old. The clean-tilled tobacco fields, even after abandonment, were susceptible to excessive erosion.

Soon the streams became muddy and the sediment was carried on into the estuaries and bays. There, where the velocity of streamflow

This aerial photograph, made in 1957, shows the deposit of sediment in old Joppa Town Harbor. From historical records the location of three previous shorelines have been determined: Precolonial (solid line), 1846 (dotted line), and 1897 (dashed line). The area filled in between time of settlement and 1846 is shown by cross hatchure; from 1846 to 1897 by diagonal hatchure.

Rumsey Mansion, built in 1721 and now vacant, is the only remaining building of Joppa Town. Ocean-going vessels once docked at the original shoreline at the water's edge in the picture.

was reduced, the greatest deposits of sediment occurred in the tidal headwaters. Several open-water ports that might have become thriving cities were converted into mudflats, in some cases within 50 years of their establishment.

The estuary at Joppa Town originally was deep enough to make a good harbor for ocean-going ships. In the early days the wharves were piled high with hogsheads of tobacco. The largest merchantmen loaded there and sailed to various parts of the world.

In 1712 a courthouse was built, and Joppa Town was the thriving seat of Baltimore County. It seemed to be a town with a bright future.

Instead, the exploitation of the land for tobacco and corn initiated a cycle of erosion that rapidly filled the upper portions of the harbor. Decline of the town began about 1750, and the county seat was moved to Baltimore in 1768.

When new bridges were constructed across the Gunpowder River in this area in the early 1900's piles were sunk 60 to 70 feet into the mud without hitting the old bottom. Recently only a pile of stones could be seen as the remnants of an old wharf, now a mile and a half inland from the navigable tidewater. All of the land between the wharf and the tidewater consists of soil washed down from the 430 square-mile watershed.

Times have changed and sediment washing into the estuary is no longer excessive as it once was. A sedimentation survey of two large reservoirs in the watershed made by the Soil Conservation Service in 1961 found that the average annual sediment yield for the period 1944 to 1961 was less than a fourth of the rate for the preceding 29 years. Details of this study are reported in "Sedimentation of Loch Raven and Prettyboy Reservoirs, Baltimore County, Md." (SCS–TP–145). The reduction in sediment movement is attributed to conservation measures and changed land use.

Accumulation of sediment is nothing new; it is as old as the oceans and the continents themselves. There have been erosion and resulting sediment deposition ever since the surface of the earth cooled from its original molten mass.

Ancient rocks exposed at the surface in the Gunpowder watershed were once sediment.

The accumulation of these water-borne clays and sands occurred slowly; the contents of one rock stratum probably were deposited over hundreds of thousands of years. Such normal, or geologic, erosion and sedimentation are no threat to our interests today; it is the rapid, man-induced erosion and sediment accumulation that require our attention.

On the 9.7 million acres in the first 157 small watersheds authorized for installation of protective measures under the Watershed Protection and Flood Prevention Act, the sources of sediment were found to be 73 percent from sheet erosion, 10 percent from gully erosion, and 17 percent from erosion of roadsides, streambanks, flood plains, and the like.

Structural measures installed in watershed projects control runoff, on the average, from 40 to 60 percent of the drainage area. Land-treatment measures on the watershed reduce erosion by as much as 50 percent, and the structures stop about 90 percent of the sediment reaching them. Together the land-treatment and structural measures may be expected to reduce the sediment yield from a watershed by about 55 percent.

The SCS estimates that about 1 billion acres of land area of the United States needs some treatment or protection. At the rate the small watershed projects are being installed, nearly 15 percent will be protected by 1980. Conservation plans have been prepared by nearly 2 million cooperators covering 650 million acres of land. Two hundred and ten million acres of this land has now been adequately treated by the application of land-treatment and structural measures for the reduction of erosion and sediment. ♦

Teamwork Approach Used in Streambank Stabilization

By David Oberwager
Work Unit Conservationist, SCS, Baggs, Wyo.

THROUGH a teamwork approach the landowners in Wyoming are reducing erosion by stabilizing streambanks along the Little Snake River.

Much of the irrigable land is low-lying along the river, and damage comes from high water and huge ice jams during the spring runoff season.

Damage usually occurs in the form of erosion of banks and flooding of high-producing meadowland. The large ice flows sometimes tear out huge chunks of meadowland, in places cutting away as much as 30 to 40 feet of bank a year. In other places, excessive scouring of the channel bottom causes lowering of the water level which leaves irrigation diversion points high and dry.

Cooperators of the Little Snake River Soil and Water Conservation District are making use of technical help from the Soil Conservation Service and financial aid from the County Agricultural Stabilization and Conservation Committee on such problems.

Timely streambank-protection measures averted serious damage on two canal company ditches that carry water to about 60 ranches in the valley.

The Little Snake River may cut as much as 30 to 40 feet of bank in a year.

Many individual landowners have completely arrested the river damage after it occurred while some have prevented future damage by installing protection before sustaining loss.

Flooding has been greatly reduced in some areas by the lowering of the river channel by natural cutting, but loss of land from scouring and cutting along the banks continues.

On the Roger Reed Ranch, a new diversion headgate and rock diversion had to be constructed because scouring had lowered the river channel, leaving the original headgate position 3 feet above the river bottom.

Three methods of streambank protection are used: Blanket, jetty, and a combination of these. The objective is to stabilize the banks by keeping the main erosive current away from them.

In the blanket method, the banks are usually sloped about 4 to 1 before laying trees or rock in place. Material is placed up to 3 to 5 feet beyond the top of the bank to allow for settling and to take care of extremely high water. Native willow cuttings are put into the

In the "combination" streambank protection method, steel railroad pilings are driven and backfilled with trees and brush.

bank along the upper edge of the riprap.

In the rock jetty method, rocks 2 to 3 cubic yards in size, are set out into the stream by a bulldozer. Smaller rocks are used to fill in the voids between the large rocks. The average jetty on the Little Snake River is 35 to 45 feet long and 8 to 15 feet high, depending on bank elevation. The jetty is keyed into the bank about 8 feet. A natural slope is developed with rocks working from a base width of 30 feet.

The angle of the jetty is usually determined by the degree of the curve in the river. Sharper curves need more jetties, spaced closer together and at a straighter angle to the current. It is important that the jetties do not extend too far into the main channel, causing a funneling effect or restricting the river flow. They must extend far enough to deflect current away from the bank, each jetty catching the bounce from the one above until a reasonably stable stretch of river bank is reached.

When rock jetties are used, no bank sloping is necessary since reduction in velocity on the downstream side of the jetty will cause sediment to deposit and allow willows and grass to start growing on the banks within a few years. Hand seeding and planting speeds up the process.

There have been no failures to date in the rock jetties, even when severe ice jams develop during the first year after installation. This method is by far the most expensive ($4.50 to $6.50 a cubic yard) to install but it may prove least expensive over a long period because of lower yearly maintenance costs and a much longer life span than other protective measures.

The "combination" method consists of driving 90-pound steel railroad rails into the stream bottom at 10-foot spacings along the bank and backfilling with trees and brush. This has been successful to a degree, but severe ice jams can break off some of the rails and cause "blowouts" in the protected area. No bank sloping is used in this method, and less meadow is lost or disturbed. The brush and trees used as backfill often sprout and take root with many sucker-like stems acting to trap the silt load. These jetties or blankets are effective only as long as the trees and brush remain in place. ♦

Time-Saving System for Land Grading

Carol Aymond, center, discusses a land-grading operation on his farm with Work Unit Conservationist Coy McClung, (left), Marksville, and Andy Sharp on instrument, (right).

Carol J. Aymond, Avoyelles District cooperator at Cottonport, La., has sharpened his land-grading methods with a time-saving twist, while rounding out his conservation program with grading on his sugarcane fields.

Aymond's system saves time for land-grading equipment operators, as well as for SCS technicians. He sets a stake on each grid intersection marked with either red or blue stripes. Each stripe represents a tenth of a foot. Three red stripes on a stake call for a cut of 0.3 foot; two blue stripes mean a fill of 0.2 foot, and so on. His drivers read what is to be done from the seat of the machine while driving. Checking the job and correcting small differences are a breeze.

District soil conservationists laid out a land-grading job on 13 acres of a 320-acre place Aymond bought in 1964. He liked the results so well he bought his own 5-yard scraper and graded 196 acres of his sugarcane land with his own farm tractors.

Better water management gives him better quality cane by eliminating water scalds, earlier starting in the spring, better weed control, easier maintenance of drainage ditches, and uniform yields over the whole cut of land.

Sound planning, hard work, and good management on his 200 acres of sugarcane, 100 acres of cotton, and 250 acres of soybeans earned him the Avoyelles District selection as outstanding conservation farmer for 1965 and the Goodyear Tire and Rubber Company recognition award. — JAMES MARTIN, *Area Engineer, SCS, Denham Springs, La.* ♦

Cropland Adjustment

Financial assistance is provided through the Cropland Adjustment and Cropland Conversion programs to assist farmers in the conservation and economic use of land and to aid States and local governments in acquiring cropland for open space, natural beauty, wildlife, or recreation developments. ♦

Erosion Control Means Money to Wheat Farmer

By Edgar F. Baumann
Work Unit Conservationist, SCS, Pendleton, Oreg.

FOLLOWING unusually heavy winter rains in Southern Umatilla Soil and Water Conservation District in Oregon, SCS conservationists at Pendleton set out to get some answers to the basic, down-to-earth question: "What's the dollars and cents value of conservation?"

Soil scientists working in that eastern Oregon wheat-growing area had observed for years the serious erosion on sloping wheatlands. But they wanted facts and figures to support their observations.

They chose for study a field in the Speare Canyon area 18 miles west of Pendleton. The soil was Condon silt loam on a north slope of 7 to 20 percent.

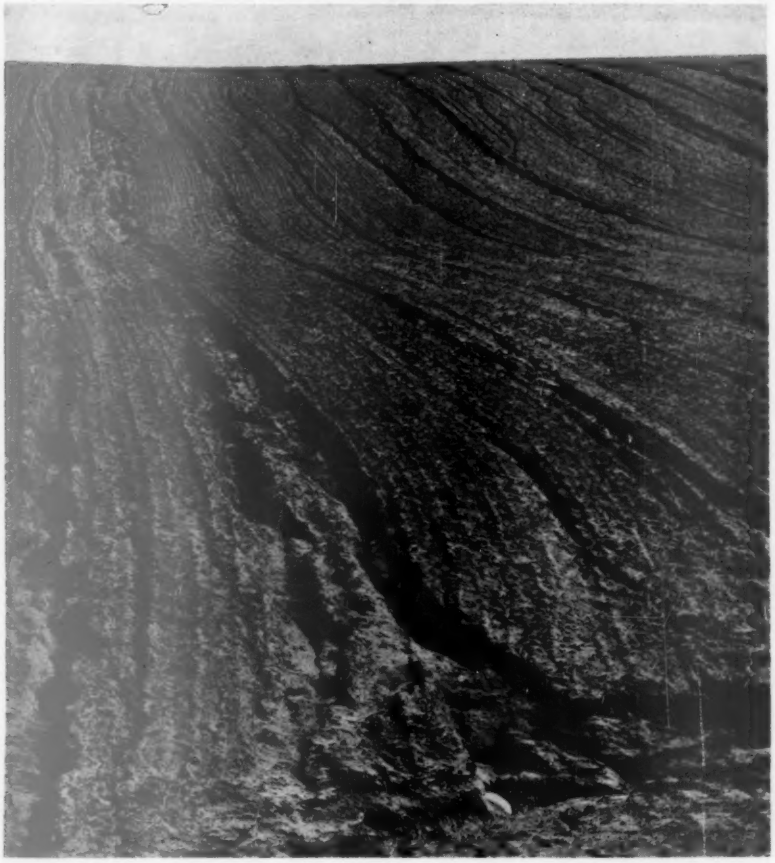
Winter wheat had been seeded late in October and November the previous fall because rainfall was inadequate at the usual seeding time in September and early October. Unusually heavy rains totaling more than 6 inches—of 50-year frequency—occurred in December and January causing heavy runoff and much soil erosion.

In March, the conservationists made measurements and estimated the soil loss on the field at 165 tons an acre, equivalent to 1.1 inch of topsoil from the entire area.

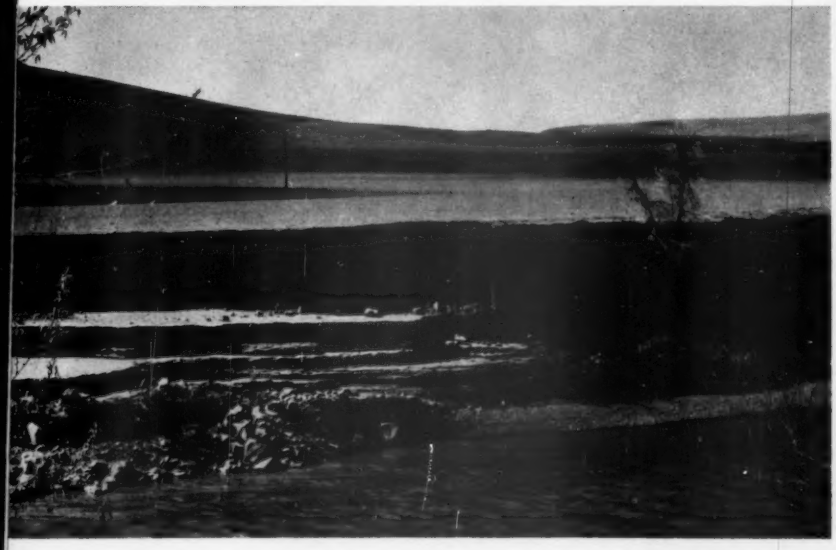
Rill and gully erosion was so severe on 40 acres of the 160-acre field that the wheat yield there was only 10 bushels an acre. The other 120 acres, only slightly eroded, yielded 42 bushels an acre.

Hence, it was concluded that erosion on the eroded 40 acres had reduced the farmer's harvest by 32 bushels an acre or 1,280 bushels of wheat. With wheat at $1.50 a

Severe sheet and rill erosion removed an average of 165 tons of soil an acre from this field of sloping Condon silt loam during heavy rains in the winter of 1964-65. At harvest time (right) the rills still show through the wheat.



Diversion terraces, such as this one on the Ray Warren farm (above), do an effective job of controlling erosion on sloping wheatlands. Streambank erosion (below) is a common problem in eastern Oregon. At this spot on the Umatilla River 5 acres of a fertile alfalfa field was lost in one flood.



bushel, the gross monetary loss was $1,920. Charged against the entire 160 acres, this amounted to $12 an acre.

What would be the cost of a conservation program adequate to prevent such loss of income? The conservationists made some estimates for the field being studied.

A sound conservation program for the field would require 5,000 feet of diversion terraces and 1,700 feet of grassed waterways. The estimated cost of these two practices would be $1,510. The Agricultural Conservation Program payment would be $955, leaving a net cost to the farmer of $555 or $3.50 an acre. In addition, he would need to plant on the contour and to seed wheat early in the fall if moisture was adequate. These practices would add little to his expenses.

The author measures rills and calculates soil removal from the study field.

Thus, a sound conservation program on this field in 1964-65 would have increased the gross income $8.50 an acre. Plugging the holes in farm income through a conservation program is something each individual can do.

Lou Levy, manager of the Cunningham Sheep Company lands, is one operator in the area who intends to do just that. Erosion was serious on the company's wheatlands. Plans are being made now to install diversion terraces in the seriously eroded areas. Other conservation practices that are effective in controlling erosion include stripcropping, grassed waterways where needed, and conversion of poor grain-producing areas back into grass.

Making a conservation program really pay requires positive action.

"Terracing is one of the best methods to reduce water erosion in this area," says C.J. Gilbert, an advisory supervisor on the district board. "If farmers built more terraces on the long slopes, they could reap higher yields while preserving precious soil for future generations." ♦

Soils Contests Train Students

CORNELL UNIVERSITY, Ithaca, N. Y., is the host institution for the Seventh National Soils Contest on May 4 to 5.

College undergraduates studying agriculture who compete in the contest have the opportunity of traveling widely in the United States and observing many different soils in contrasting regions.

For the soils contest, the United States is divided into seven regions. Within each region, regional soils contests are held. The two winning teams from each region compete among regions on a national basis.

Many of these teams travel extensively. Some of them go to different States in widely separated areas of the country. This gives each participant an opportunity to make a detailed examination of many different soils.

Soils teams are generally coached throughout the year. Regional contests are usually held in the fall and national contests in the spring. Before each contest, the host institution holds tours that inform contestants of the various soils and landscapes in the contest area. These tours are conducted by local scientists of the Soil Conservation Service and Land-Grant Colleges. Soil characteristics are explained and questions are answered.

During the contest three or four pits exposing soil profiles are examined. Contestants dig into the soil and describe each soil characteristic carefully. Each contestant must evaluate and record on a scorecard certain site characteristics that include position of site, parent material, slope, erosion, and surface runoff. Scorecards are immediately corrected by a panel of experts from the Soil Conservation Service and Land-Grant College.

The winning teams and highest scoring individuals receive awards or recognition at a banquet on the evening of the contest. Trophies and awards for the national contest are presented by the American Society of Agronomy.

Soil Conservation Service student trainees consistently do well in these contests. The student chairman of the 1967 contest at Cornell University, Thomas M. Ballagh, worked for SCS last summer as a soil scientist trainee at Watertown, N. Y. ♦

Lettuce Harvesters Aid Truck Farmers

Two cooperators of the Oswego Soil and Water Conservation District, N. Y., who grow truck crops on muck soils have purchased two lettuce harvesters. To use the new equipment efficiently, they converted their drainage systems from open drain to tile.

The revised drainage system makes possible eight more rows of crops an acre and permits better weed control. Use of the new machines keeps hired help gainfully employed, puts a cleaner product in the box, and increases profits.

The cooperators credit assistance from the Soil Conservation Service and the district with making all this possible. ♦

Level Basin Systems Reduce Wastage of Irrigation Water

By M. J. Bossuyt
Work Unit Conservationist, SCS, Casa Grande, Ariz.

FARMERS in the West Pinal Soil Conservation District of Arizona are turning increasingly to the "basin" system of irrigation to reduce wastage of water.

Alarmed at falling water tables and pressed by rising labor and water costs, irrigators are using other improved methods also—sprinkler systems, adjusting syphon hoses to the different rates of water intake of different soils, return and reuse of tailwater, and the like. But the basin system generally gives the greatest gains in efficiency of water use.

Authoritative sources estimate that the average efficiency of irrigation in the United States is less than 50 percent—that is, less than half the water applied to fields is held in the root zone where it is used by crop plants.

With the basin system, West Pinal District cooperators have attained efficiencies of 80 percent and more. Water savings have amounted to as much as 50 percent of the amount applied, where conservation methods are followed.

In the basin system, the field is divided into segments, each completely enclosed by border dikes. Each resulting basin is watered separately. The surface in each basin is graded level, allowing not more than 0.2 foot of total fall lengthwise and not more than 0.1 foot per 100 feet crosswise. As a result, the water covers the entire basin at about the same depth and no water escapes from the enclosure. There is no tailwater from a basin irrigation system.

After converting from a conventional open-ditch system, Cooperator Ed Farrell commented, "I now use one-fourth the time and save one-half the water."

Under the old system, it took 12 hours for the water to reach the end of the furrows and 12 hours more

There is no waste of water from this field on the Jim Pate farm in the West Pinal Soil Conservation District. Jim Alam, SCS soil conservationist, finds the water evenly distributed for maximum usage.

Tailwater is wasted from a field (left) where the slope is too great to allow irrigation water to soak into the soil before it reaches the end of the rows. SCS technicians (right) test the infiltration rate of a field to determine correct rate of water application.

to "sub up" to the seedbed on the ridges. Now he completes the irrigation of a set in 6 hours. Because he has no tailwater, he is smoothing out his tailwater return ditches and incorporating the land into the field.

Fred Enke is another farmer who has converted from the conventional slope system to basin irrigation. His soils are fine-textured with water intake rates of less than 0.25 inch an hour. He had difficulty getting water into the soil with the old system. The basin system cut his water costs from $70 to $30 an acre.

In the West Pinal District, average water costs, excluding maintenance and repair, are between $50 and $60 an acre, at approximately $5 to $7 per acre-foot. This means that farmers are using 7 to 10 acre-feet of water per crop with the conventional slope method of irrigation.

With properly designed level basins and adherence to proper irrigation principles, conservation farmers are using about 4 acre-feet of water per crop. In addition, the water is distributed more uniformly throughout the plant root zone, resulting in better environment for effective plant growth and greater net returns from the crops. ♦

Cattle and Recreation Compatible on Ranch

Livestock and commercial recreation can be compatible, Donn Bonnheim learned when he developed recreation on his 6,500-acre cattle ranch west of Paso Robles, Calif.

Bonnheim, a cooperator of the Las Tablas Soil Conservation District, with the help of the SCS, worked up a conservation ranch plan and built six farm ponds, developed eight springs, and cleared brush from about 200 acres and seeded it to grass.

He observed an increase in wildlife as the conservation progressed. Deer hunting improved, coveys of quail grew in size and number, ducks stopped over on the farm ponds, and more doves took advantage of the improved feed and water conditions.

Adding commercial recreation to his ranch operations, Mr. Bonnheim in 1963 leased the recreational facilities for 1 year to a club of 20 members. After the first year, a new lease was signed for 4 years, and membership increased to more than 30 guests.

Activities for club members include camping, hiking, hunting, and fishing, with a limitation of one deer, one wild hog, and daily quotas of quail, doves, pigeons, and ducks for each hunter during the hunting season. Fishing is permitted at all times.

To further increase ranch income, he planted pheasants and chukars, provided by the California Department of Fish and Game, to be hunted as their population increases. He plans a large dam that will provide a reservoir for recreation and irrigation.

"By the end of the current 4-year contract, income from recreation should exceed income from my 350-cow livestock operations," says Donn Bonnheim.—RAYMOND C. COOPER, *Work Unit Conservationist, SCS, Paso Robles, Calif.* ♦

Government Loans Help Low-Income Rural People

Rural loan programs, authorized by the Economic Opportunity Act for developing small farms and businesses and obtaining cooperative services, assisted more than 21,600 low-income rural families during 1966.

A total of $24.2 million of these loans, administered by the Farmers Home Administration, were made to nearly 15,500 low-income families to start small businesses or improve their farming operations.

Also 336 loans totaling more than $3.5 million were made to rural cooperatives serving more than 6,124 families. ♦

Conservation Practices Help Boys Town

BOTH KINDS of conservation—human and soil—are practiced at Boys Town, Nebr.!

"It looked like an eroded sunflower patch when I first walked over it back in the early forties," said Cal Jorgensen, SCS work unit conservationist in the Douglas Soil and Water Conservation District. "Only a prophet could have foreseen this land becoming Douglas County's 1966 Conservation Farm of the Year."

Neglect through the years had left the hilly land badly eroded and low in productivity.

Father Flanagan, founder of Boys Town, and Farm Manager Robert Steffen realized the conservation job ahead was a big one. Beginning in 1942, they cooperated with the conservation district in developing a farm conservation plan.

Steffen says, "We worked closely with the soil conservation district and SCS technicians in following this plan through the years. When the need to revise or update a practice was evident, like widening our terraces to accommodate newer equipment, we did it. We have found that continual maintenance of our practices makes conservation work best."

Today, in place of the "eroded sunflower patch," you can see tree plantings, wildlife habitat, field border plantings, and drainage ditches. There are almost 900 acres farmed on the contour, 40 miles of terracing, and more than 50 acres of sod waterways. Corn followed by an alfalfa-grass mixture is the cropping system. There is always about 400 acres of good pasture. A manmade lake provides fishing and boating.

Boys Town's 30-acre manmade lake (above) is used for boating and fishing. This is the largest manmade lake in the Douglas Soil and Water Conservation District. With minimum tillage and crop rotation practiced (below), this contoured and terraced field is protected from erosion.

These conservation practices paid off in 1964 when a 6- to 10-inch rain fell within a 2-hour period in the Omaha area. Seven lives were lost, and damage to the land and to many houses in the Papillion Creek drainage area was estimated at $7 million. Hell Creek, a part of the drainage area, originates just north of Boys Town and flows through it for 1½ miles. Because of proper conservation practices, the Boys Town land weathered the storm with practically no damage. ♦

"Soil, Water, and Suburbia" Is Topic of Joint Conference

SOIL AND WATER problems that once seemed to conservationists as almost entirely rural, but which now are recognized as equally pressing in urban and suburban areas, will be the subject of a conference on "Soil, Water, and Suburbia" June 15 and 16 at the Jefferson Auditorium, Department of Agriculture, Washington, D. C.

Secretary of Agriculture Orville L. Freeman and Secretary of Housing and Urban Development Robert C. Weaver will appear on the program.

The two departments are jointly sponsoring the conference. Land developers, investors, planners, architects, engineers, scientists, and county and municipal leaders are being invited to attend.

The two Secretaries, in announcing the meeting, said:

"Critical problems of damage, waste, and future extra municipal costs are arising in countless urban communities because of methods presently used in many developments in the fringe area between urban and rural America.

"We hope that this conference may take a start toward accelerated solutions, throughout the country, of the many problems created by ill-planned or unplanned suburban and exurban growth, where staggering amounts of eroding topsoil are polluting our rivers, our recreation and fishing areas, and our drinking intakes.

"The conference is being planned to cover all major phases of soil and water management in connection with land development, provide practical information for planners and developers, determine needs for additional research, and improve channels of communication with developers and others concerned with rural-urban fringe areas. In these and other ways we hope to help them:

"—cut construction and other costs,

"—reduce health hazards,

"—protect and enhance natural beauty and provide open green space,

"—reduce erosion, flood, and sediment damage,

"—control one major source of water pollution." ♦

USDA Contracts for Sediment Research

Engineers at Pennsylvania State University, University Park, will develop mathematical formulas for calculating the movement of sediment in streams under a $28,106 research contract awarded by the U. S. Department of Agriculture.

Sponsored by USDA's Agricultural Research Service, the 1½-year program will be conducted by Samuel Shulitz, of the University's Civil Engineering Department. Donald E. Whelan will be the ARS technical representative.

Mr. Shulitz will concentrate on sediment movement in small, unstable channels common to agricultural watersheds. Excessive upstream channel erosion by gravel and rocks causes two main problems—(1) sediment buildup in downstream channels, and (2) flooding of agricultural lands with excessive sediment deposits in reservoirs. ♦

Greenspan Helps Schools Buy Land for Recreation

Under a Greenspan agreement with USDA, the Murdock Public Schools in Swift County, Minn., about 100 miles west of Minneapolis, are buying 7.5 acres of cropland for recreation and beautification.

These schools plan to plant trees on 5.4 acres and seed to grass or other vegetative cover the remaining 2.1 acres.

The grant from Greenspan will be $667.51, or about a third of the $2,250 purchase price. Greenspan is part of the USDA's Cropland Adjustment Program that authorizes help to public entities desiring to obtain land in surplus crops for permanent conversion to open space, public recreation, and so on.

USDA will also provide $122.58 in cost-share assistance to the schools in planting the trees and vegetative cover. ♦

Country Church Rallies to Save Watershed Plan

A COUNTRY CHURCH in the Lincoln County Soil Conservation District in southeastern Kentucky rescued hopes for outdoor recreation centers sorely needed by communities in the Buck Creek Watershed Project.

When local interest wavered in the face of costs to be shared for the $890,000 program, parishioners of tiny St. Sylvester's Roman Catholic Church heard Father Herbert L. Uphaus describe the two proposed dams and 36,000-acre land treatment. He said the move expressed a birthright passed along to them by their soil-loving Swiss and German forebears.

"Beautiful new lakes, recreation features, and the well-tended hillsides will help to hold our youngsters here at home," Father Uphaus said. "Dams, too, will unify our community; they'll protect us all like miraculous umbrellas each time the floodwaters threaten."

Laymen led by Tom Schuler, member of the Lincoln County District, set up a nonprofit Buck Creek Foundation. Embracing all civic interests including 670 farmers in the project area, the group offered family usage permits for the planned recreation sites.

Eagerly accepted at $45 apiece, the shares climbed to a total of $5,000, sufficient to help secure all easements and rights-of-way needed for construction operations.

Building of a flood-retarding dam with a permanent pool of 40 acres began. Another flood structure impounding 30 surface acres of water was designed. Conservation work improving 9,000 acres of pasture and 1,500 acres in woodland was hastened. To protect the dams, modest-income farmers used Appalachia "speed-up" funds. Quickly, the measures satisfied 50 percent of the land-planning aims.

Dreams pursued by parishioners of St. Sylvester and their neighbors are flowering elsewhere in the locality as the rural area develops.

Stanford, the county seat, has been named one of six "All-Kentucky Cities" for 1966.

A new mobile home plant employing 100 workers has begun operations.

Just completed is a 9 hole community golf course with a clubhouse, swimming pool, and two fish ponds.

A new youth center and park is being completed by local community groups.

A 30-bed extended-care facility is being added to the new 50-bed hospital. Land has been obtained for construction of a personal care home for 40 elderly residents.

Stanford's new water system has just been tripled in capacity, and a new sewage treatment plant is now under construction.

Eighty-six acres of land has been purchased for additional industrial development.

A new water district has begun supplying the nearby towns of McKinney and Hustonville.

The spirit and will to move ahead in community development came directly from local people themselves; the life force might be called "soul" conservation in Father Uphaus' view.—LUTHER C. GABBARD, *Work Unit Conservationist, SCS, Stanford, Ky.* ♦

A Conservation Profile:

New Associate Administrator Is a Career SCS Conservationist

THE NEW associate administrator of the Soil Conservation Service, Kenneth E. Grant, is a career conservationist who at age 47 already has more than 20 years' experience in public service to his credit.

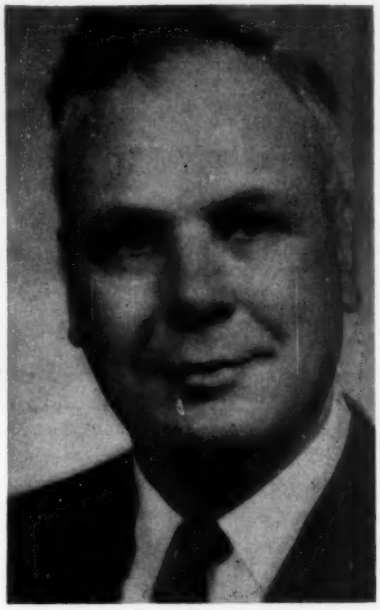
In announcing Grant's appointment to succeed Gladwin E. Young upon his retirement April 30, Secretary of Agriculture Orville L. Freeman said Grant has done an "outstanding job" as SCS State Conservationist in Indiana, a position he has held since June 1964. Previously, he was State Conservationist in New Hampshire for 2 years.

The Secretary cited Grant's "exceptional leadership" as the Department of Agriculture's representative on the Ohio River Basin Studies, first of its type to be completed, the Inter-Agency Committee for the Wabash River Basin, and the technical advisory committee of the Wabash Valley Interstate Commission.

Other accomplishments by Grant cited by Secretary Freeman included leadership in developing the first Resource Conservation and Development Project in the Nation (Lincoln Hills Project in Southern Indiana) and in stimulating accelerated cooperative efforts of local, State, and Federal agencies in multiple-purpose watershed projects.

Grant is a native of Rollinsford, N. H. He received a B. S. degree in agriculture, with a major in agronomy, from the University of New Hampshire, in 1941, and a Master's degree in public administration from Harvard University in 1964.

He worked as a Department of Agriculture collaborator in 1941 while a graduate assistant at the University of New Hampshire. He served in the United States Army from December 1941 to October 1945.



Kenneth E. Grant

Grant joined the Soil Conservation Service as a junior soil scientist at Keene, N. H., in 1946. He rose rapidly through the ranks, from work unit and area conservationist positions, to the State technical staff. He became deputy State conservationist in 1956 and was promoted to State conservationist in 1959, holding that position until his promotion and transfer to Indiana in June 1964. ♦

People a Dominant Factor

The SCS recognizes *people* as a dominant factor in each local resource situation and as the reason for conservation itself. The resources of soil, water, plants, and wildlife are significant only as they provide for the needs of people. ♦

Senior Citizen Keeps Love of Land

Mrs. Cora Finister agrees with SCS Work Unit Conservationist Ellis Dawson that soil is the basic resource of her farm.

BEING a senior citizen hasn't dampened the conservation zeal of Mrs. Cora Finister.

One of the oldest cooperators with the Lower East Red River Soil and Water Conservation District, Louisiana, she says, "The conservation of our soil, water, and forests should be the concern of every American, old or young, rich or poor."

Mrs. Finister retired in 1948 after teaching school for nearly 50 years. She lives on her 13-acre farm in LaSalle Parish where she was born 88 years ago.

The daughter of a slave who came to Louisiana after the Civil War, she has never lost an appreciation for the soil that she learned in her childhood almost a hundred years ago.

"At that time I recognized that our land was wearing out after 70 years of farming," she says. "Cotton, corn, and potatoes were our cash crops, and we had to take care of our land so it would take care of us."

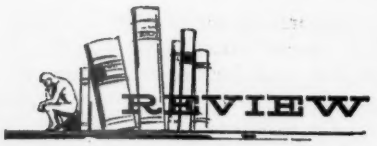
In 1951, Mr. and Mrs. Finister became cooperators with their soil conservation district. J. E. Cammack, Soil Conservation Service technician, now retired, assisted them in developing a conservation plan.

The practices planned, and later applied, on the Finister farm were terracing, contouring, cover cropping, and managing crop residues to put back what was taken out of the soil. "Someone else has farmed my land since my husband's death in 1954, but my love for the land has continued, and I have watched over it closely," she explained.

Mrs. Finister says she wants to die on the land that she loves so well.

"It gives me peace of mind to live close to the land that is so much a part of me," she says. Most of her activities are now confined to raising a garden and reminiscing of days in the past.

But she is quick to respond to the question, What does the soil mean to you now? "It's something that gives me hope that come next spring flowers will bloom, trees will grow, Nature's handiwork will be about us, and I will have a place to put my seed for another year." ♦



Environmental Improvement (Air, Water, and Soil). EDITED BY RALPH W. MARQUIS. *1966. The Graduate School, U. S. Dept. of Agr., Washington, D. C. 105 pp.; paper, $1.50; cloth $3.00.*

This book contains the texts of four lectures and the comments of two "reactors" to each, presented in May 1966 under the auspices of the Graduate School, U.S.D.A., in the Thomas Jefferson Memorial Auditorium in Washington.

At a time of awakening interest in environmental quality, the distinguished scholars and public officials probed a broad range of questions bearing on the problem. The principal lectures are:

"Man and his Environment—Scope, Impact, and Nature," by Dr. Rene Jules Dubos, professor of the Rockefeller University, New York City, a microbiologist.

"Environmental Improvement—Institutional and Governmental Aspects," by Senator Edmund S. Muskie of Maine.

"Control of Environment—Economic and Technological Prospects," by John T. Middleton, Director of the University of California's Statewide Air Pollution Research Center.

"The Future of Environmental Improvement," by Dr. S. Dillon Ripley, Secretary of the Smithsonian Institution.—B.O.

Mission in the American Outdoors. EDITED BY E. W. MUELLER AND GILES C. EKOLA. *1966. Concordia Publ. House, St. Louis, Mo. 165 pp. $4.95.*

Fourteen papers from the 1964 Seminar on Outdoor Recreation sponsored by the National Lutheran Council, Chicago, include 5 by officials of the Department of Agriculture: Alfred E. Edwards, deputy assistant secretary; Lloyd E. Partain, Soil Conservation Serv-

ice; George S. James, Forest Service; and Karl F. Munson and E. J. Niederfrank, Federal Extension Service.

The book is published for the guidance of church leaders concerned with use of leisure time.

Its senior editor, E. W. Mueller, secretary for Church in Town and Country, National Lutheran Council, has been a longtime leader in Soil Stewardship activities sponsored by the National Association of Soil and Water Conservation Districts.—B.O.

New Publications

Natural Resources of Wyoming. *1966. U. S. Dept. Int. 80 pp., illus. $0.65.* The 16th in the Department of the Interior's series of descriptive publications on the resources of the States follows the established format.

The handsome booklet characterizes Wyoming as "mountains and plains alternating" (a translation of its Indian name), at once a frontier land and a modern State.

The physical characteristics and natural resources are described, then the programs of the Federal resource agencies operating in the State are outlined. Besides those of the Department of the Interior, the Forest Service and Soil Conservation Service of the Department of Agriculture and the Army Corps of Engineers are subjects of brief sections.

The Development of a Program for the Salt-Wahoo Watershed in Nebraska. By John Muehlbeier, Otto Thiemann, Howard W. Ottoson, and Lloyd K. Fischer. *1966. Univ. Nebr. SB 490, Lincoln, Nebr. 51 pp., illus.* Settlement of the watershed began in about 1856 and was sporadic until 1859, when the Overland Trail to the West was changed to a more direct route through the area. Flooding along Salt Creek was apparent from the very first. This report describes the problem of the floods along Salt Creek and tributaries and traces the development of soil and water conservation and flood control.

Resistance to Flow in Alluvial Channels. By D. B. Simons and E. V. Richardson. *1966. U. S. Dept. Int. Geol. Surv. Prof. Paper 422-J. 61 pp., illus. $0.50.* Presents concepts that can assist in the development of a better understanding and control of the dominant factors affecting the geomorphology of streams and rivers. These concepts can be utilized in designing stable irrigation canals constructed in alluvium and in determining the discharge that occurred in a natural channel during a runoff event if only residual information is available.

Erosion and Deposition in the Loess-Mantled Great Plains, Medicine Creek Drainage Basin, Nebraska. By James C. Brice. *1966. U. S. Dept. Int. Geol. Surv. Prof. Paper 352-H. pp. 255-339, illus. $0.55.* Differences in runoff and sediment discharge among five subbasins are attributed to differences in relief ratio, adjusted frequency of first-order channels, and percentage of area in upland. Active gullies are attributed to land use since settlement rather than to climatic change. Native vegetation and conservation measures would be effective in the control of the numerous valley-head gullies.

Uses of Airphotos for Rural and Urban Planning. By Jeanne M. Davis. *1966. USDA Agr. Hbk. 315. 39 pp., illus. $0.30.* Airphotos can be used in many ways, such as in preparing land use maps, measuring the size of a lake or a field, selecting a school site, inventorying recreation facilities, and determining change in rate of land use. The author presents in detail information about types of airphotos, uses in planning, photo-interpretation problems in planning, steps in their use for interpretation, availability, and how to obtain aerial photography.

Forester's Guide to Aerial Photo Interpretation. By T. Eugene Avery. *1966. USDA Agr. Hbk. 308. 40 pp., illus. $0.50.* A practical reference that gives information on types of aerial photographs, and how to use them in forest inventory and planning. The booklet gives instructions on obtaining aerial photography, preparing photographs, photo scaling, identifying forest types and tree species, measuring areas, determining tree height, crown diameter, and crown closure, aerial cruising, and photo stratification for ground cruising.

Fluvial Sediment in the Little Arkansas River Basin, Kansas. By C. D. Albert and G. J. Stramel. *1966.* U. S. *Dept. Int. Geol. Surv. Water-Supply Paper 1798-B. 30 pp., illus., with separate map. $0.60.* Study of characteristics and transport of sediment in water from the river showed that although sediment load varied widely, the water could be used for direct municipal use most of the time. Artificial recharge of ground water using raw turbid water for injection into wells and pits is probably not feasible.

Sedimentation and Chemical Quality of Surface Water in the Heart River Drainage Basin, North Dakota. By M. L. Maderak, *1966. U. S. Dept. Int. Geol. Surv. Water-Supply Paper 1823. 42 pp., illus., with separate map. $0.55.* Construction of Heart Butte Dam in 1949 and Dickinson Dam in 1950 reduced the mean annual streamflow near Mandan about 10 percent and the average annual suspended discharge by nearly half. Quality of the water in the reservoirs normally is suitable for public use.

Sedimentation in Brownell Creek Subwatershed No. 1, Nebraska. By James C. Mundorff. *1966. U. S. Dept. Int. Geol. Surv. Water-Supply Paper 1798-C. 49 pp., illus., with separate map.* Presents results of a sedimentation study which was made as part of a nationwide investigation of the trap efficiency of detention reservoirs. The trap efficiency of the reservoir studied was between 90 and 95 percent.

Fluvial Sediment and Chemical Quality of Water in the Little Blue River Basin, Nebraska and Kansas. By James C. Mundorff and Kidd M. Waddell. *1966. Dept. Int. Geol. Surv. Water-Supply Paper 1819-H. 45 pp., illus. $0.25.* Some of the findings of the water-quality investigations made in 1951–63 at five different sites on the Little Blue River.

Hydraulic Conductivity and Other Physical Characteristics of Some "Wet" Soils in Southwestern Minnesota. By L. F. Hermsmeier. *1966. USDA ARS 41-127. 17 pp., illus.* Compares some of the drainage characteristics of the soils in shallow depressional areas for use in determining tile and surface drainage requirements.

America's Conservation Districts. *1966. Natl. Assoc. Soil and Water Conserv. Dist. (League City, Tex.) 20 pp.* An explanation of how local conservation districts came into being in response to the need for conservation action. The folder describes how the districts work, the conservation plan, community programs and the task ahead.

Chemical Control of Range Weeds. By Chemical Plant Control Subcommittee, Range Seeding Equipment Committee. *1966. U. S. Dept. Agr., and U. S. Dept. Int. 39 pp. $0.30.* Recommended methods by species for woody plants and forbs.

Deep-Tillage Investigations on Alluvial Soil in the Sugarcane Area of Louisiana. By Irwin L. Saveson, Zane F. Lund, and Lester G. Davidson. *1966. USDA ARS 41-123. 21 pp., illus.* Evaluation of the deep-tillage treatment, soil physical properties, soil moisture response, and crop response for crop years 1955-62.

Safe Use of Agricultural and Household Pesticides. *1967. USDA Agr. Hbk. 321. 65 pp., illus. $0.50.* A reference work for farm advisers, county agricultural agents, extension home economists, and others who carry out the educational activities of the U. S. Department of Agriculture.

Handbook of Agricultural Charts 1966. *1966. USDA Agr. Hbk 325. 155 pp., illus. $0.45.* Tables and drawings presenting the situation, production and resources, foreign trade, marketing, population and rural development, the family, and commodity trends.

USDA Helps Expand Outdoor Recreation for Fun and Profit. *1966. USDA PA 780. 16 pp., illus.* Superseding "Accelerating Rural Outdoor Recreation on Public and Private Lands," pictorializes and gives facts and figures on outdoor recreation.

Physiographic Divisions of Alaska. By Clyde Wahrhaftig. *1965. U. S. Dept. Int. Geol. Surv. Prof. Paper 482. 52 pp., illus., with separate maps in folder.* A classification and brief description with a discussion of high-latitude physiographic processes.

Probability Concepts in Geomorphology. By A. E. Scheidegger and W. B. Langbein. *1966. U. S. Dept. Int. Geol. Surv. Prof. Paper 500-C. 14 pp., illus. $0.20.* A theoretical discussion of processes that give landscape its form.

Skiing the National Forests—America's Playgrounds. *Rev. 1966. USDA PA 525. 24 pp., illus. $0.30.* This beautifully illustrated booklet, partly in color, lists the ski areas located in the National Forests.

The Agricultural Research Center. *1966. USDA Agr. Inf. Bul. 189. 37 pp., illus. $0.30.* Lists and describes the divisions and activities in the USDA's research center.

A Bibliography on Marketing Woody Plants and Related Nursery Products 1944–65. Compiled by Jules V. Powell and Dorothy M. Lundquist. *1966. USDA Misc. Pub. 1039. 23 pp. $0.20.*

Grass . . . the Rancher's Crop. By J. S. McCorkle. *Rev. 1967. USDA Leaflet 346. 8 pp., illus. $0.10.* Gives information on the role of grass as soil builders.

The Role of Local Government in Economic Development of Rural Areas. *1966. USDA Agr. Econ. Rpt. 94. 20 pp.* Gives research needs and opportunities.

The Interior of the Earth. By Eugene C. Robertson. *1966. U. S. Dept. Int. Geol. Surv. Circ. 532. 10 pp., illus.* An elementary description of the crust, mantle, and core.

Land-Capability Classification. By A. A. Klingebiel and P. H. Montgomery. *Reprinted 1966. USDA Agr. Hbk. 210. 21 pp. $0.15.*

Soil Conservation Service: What It Is and What It Does. *Rev. 1967. USDA SCS-CA-9. 19 pp.*

Soil Surveys

Jefferson County, Kentucky. By William H. Zimmerman. *1966. 137 pp., illus.; maps 4 inches to the mile (1:15,840).* Field survey by James C. Ross, J. P. Fehr, B. L. Wilson, W. H. Zimmerman, D. T. Carroll, and C. D. Luttrell.

Powers County, Colorado. By James P. Pannell, Roy J. Larsen, M. Bruce McCullough, Ronald E. Moreland, and Stanley O. Woodyard. *1966. 147 pp., illus.; maps 4 inches to the mile (1:15,840).*

Metcalfe County, Kentucky. By Earl E. Latham and Arlin J. Barton. *1967. 82 pp., illus.; maps 4 inches to the mile (1:15,840).* Soils surveyed by Earle E. Latham, Arlin J. Barton, Donald S. Henry, and Ronald D. Froedge.

Tolland County, Connecticut. By Lewis W. Ilgen, Allen W. Benton, Kenneth C. Stevens, Jr., Arthur E. Shearin, and David E. Hill. *1966. 114 pp., illus.; maps 4 inches to the mile (1:15,840).*

Codington County, South Dakota. By Toivo J. Ollila, Lorenz M. Fox, Laurence L. Kobriger, and Dean R. Purrington. *1966. 67 pp., illus.; maps 3.17 inches to the mile (1:20,000).*

Judith Basin Area, Montana. By E. K. Hogan, J. L. Parker, Van K. Haderlie, R. C. McConnell, and W. W. Janssen. *1967. 155 pp., illus.; maps 3.17 inches to the mile (1:20,000).*

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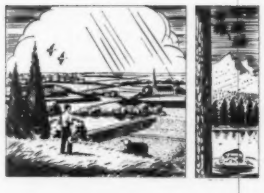
From the Administrator:

The Challenge of Stewardship



EACH OF US is a steward of the land. Each owes a debt to Providence for the riches of nature which have been bestowed upon our Nation.

Our stewardship is the mark of our gratitude. And if we are good stewards we are repaid, again and again, by prosperous towns and a flourishing countryside.

Responsible stewardship requires strengthening the town and country relationship through better understanding, cooperative resource development programs, and needed technical and financial assistance.

It challenges us to so enhance the quality of the environment in this Nation that future generations will enjoy a healthier and more prosperous way of life than we know today.

Good stewardship must assure, within the limits of our abilities, the return to the people the natural bounties that have been denied them through waste and neglect.

The active support of every American is needed to realize this promise.

Let us begin with youth.

Let parents make it a prime funtion of the home to teach their children the worth of the land and the streams and the importance of respecting them always as the lasting basis of life and prosperity and well-being.

Let schools make resource conservation a part of their academic responsibilities — not as a single prescribed course but in the overall assignment of our educational system to describe and explain what America is and what it means, what has been done, and what needs to to be done to preserve our country's values and enhance its benefits.

Let private organizations strive to inform the public of every citizen's responsibility to do all within his ability to protect and enrich the land and water heritage and to offer such assistance as is possible to attract public support.

Let city and town governments accord resource conservation the same concern they give fire and police protection, street maintenance, schools, libraries, hospitals, and the other concerns of community life. Then municipal and county codes and ordinances will reflect the urgent need to plan wisely, build soundly, and protect diligently the land and water resources upon which the community depends.

Let State governments recognize their full responsibility to fight erosion and stream pollution in their own public service activities, and by statute require compliance by others, in the public interest.

A closer partnership of local, State, and Federal agencies and organizations should develop that would permit more effective action to assure sound resource conservation and development in every region of every State.

The need for adequate resource management is greater today than at any time in the past.

Not only is our population increasing, but our more affluent society continues to require more of the benefits that only nature can provide.

These added uses of our resources have multiplied their waste and destruction. The land has been ill-used. The streams have been polluted on an increasing scale as the Nation has become more prosperous.

At a time when we can best afford to exercise caution in the use of our basic natural resources, we have squandered them.

We are losing the equivalent of 400,000 acres of good land a year from erosion and other forms of soil deterioration.

More than a billion dollars a year in flood damages still occur in the Nation's upstream watersheds.

Sediment damage in upstream areas costs an estimated $87½ million a year—most of which could be prevented by small watershed projects.

We can prevent waste. We can protect the land and waters against heedless destruction. We can apply sound thinking and practice selectivity in using soils to assure that our soil and water resources will serve to their fullest the expanding needs of our society.

By proper planning, we can locate the necessary highways, airports, and urban developments without sacrificing—as we so often do now—too much of the Nation's best tillable soil that *will* be needed to meet the future heavy demands upon our agricultural potential.

As always, we are depending heavily on local conservation districts to accomplish more with the resources we have. And we are relying on stronger local and State support of this mutually beneficial effort.

Coordinated resource planning—planning that maps the *total* setting of American life in the crucial decades just ahead—is the key to sound national growth and prosperity. Such planning can provide the incentive and the means to move forward. It can assure the kind of America that we look forward to developing in the remaining years of the 20th Century.

This is the burden of our stewardship of that three-quarters of the land in the care of private hands. In the quality and dedication of this stewardship rests the destiny of a Nation. The challenge is no less than that.

—D. A. WILLIAMS

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Boy Scouts Learn Conservation Methods

SINCE 1950, the Central Wasco Soil and Water Conservation District, Oreg., has cooperated with the Boy Scouts of America, Government agencies, private industry, and local people in providing a planned outdoor training program for Boy Scouts at Camp Baldwin, on the eastern slopes of Mt. Hood.

Ron Sumner, camp director, believes that in 1 week's camping experience, a Scout receives more training, has more opportunity to learn leadership, and receives more instruction in scouting methods than in a year of weekly meetings.

The camp is on the site of an early logging camp and mill, surrounded by more than 600 acres of mountainous timberland rich in various kinds of trees and wildlife.

Camp Baldwin provides an excellent opportunity for boys who are working toward soil and water conservation merit badges. Special conservation days provide an opportunity for boys to work on projects.

Within the camp area, the boys can get experience in soil and water conservation, woodland and wildlife conservation, rifle marksmanship, archery, riding, campcraft, nature studies, and other outdoor activities. Campfires are held in the evenings. An outdoor area provides space for church services.

The manmade lake at Camp Baldwin is a center of learning and recreation.

A Scouters' Weekend is held each year, when families of the Scouts take part in cleaning trails, camping areas, outdoor classrooms, and in preparing the area for the summer. In recent years, nearly 500 persons have participated in these events. This acquaints parents and local scout leaders with the many activities of the camp.

A popular feature of Camp Baldwin is its new 6-acre lake, which the boys use for boating, canoeing, or swimming. Assistance from the Soil Conservation Service through the Central Wasco District helped make the lake a reality.—GEORGE L. GREEN, *Soil Scientist, SCS, The Dalles, Oreg.*♦